

report of the work will be presented every year to subscribers of 2*l.* 2*s.* and upwards, and for five years to all donors of 10*l.* 10*s.* Cheques should be sent to the treasurer, Mr. T. Rowland Hughes (North and South Wales Bank, Liverpool), and requests for information addressed to the organising secretary Captain A. O. Vaughan (38 Bedford Street, North Liverpool).

DR. P. J. C. JANSSEN.

FRANCE is again called upon to mourn the loss of a veteran astronomer whose services have rendered him conspicuous among the many eminent men of science his country has given to the world. Jules Janssen, born in 1824, was first a painter, but for more than fifty years contributed to the scientific literature of his country and enriched many departments of physics by his untiring energy, his accurate observations, and his fertility of resource. He was a great traveller; his first scientific expedition was in 1857 to Peru, to study the magnetic equator. Ten years after he was studying the eruption of Santorin with Fouqué. It is not possible to do justice to his work within a small compass, but fortunately its salient features will long remain fresh in our memories.

Janssen's reputation will rest mainly upon his numerous and important researches on light spectra, and the methods he employed for pursuing his investigations. He early recognised the power of the spectroscope as an engine for research, and in its application to many problems connected with solar activity he was without rival among his own countrymen. In 1862, he published the first results of his celebrated researches on the origin of the telluric lines in the solar spectrum, and it is only necessary to recall the history of spectroscopy in the last half-century to make us appreciate the value of his pioneering services in this direction. The perseverance and ardour with which he pursued this subject was shown, first at La Villette, where he so arranged his experiments that the light the spectrum of which was to be examined passed through a tube, 37 metres long, containing steam under a pressure of seven atmospheres, and later, at Geneva, where in another series of experiments the light traversed several miles of atmosphere immediately overlying the lake. For many years the same problem in different aspects occupied his attention.

Long after the part played by water vapour in modifying the spectrum had been settled, Dr. Janssen had recourse to experiments of the same nature in order to decide the precise character of the spectrum effects due to oxygen. The pursuit of this question and his anxiety to vary as much as possible the conditions under which his observations were made, carried him to the top of Mont Blanc, where his experiments warranted him in asserting that there was no evidence of the presence of oxygen in the exterior and cooler parts of the solar atmosphere. To speak with equal confidence of the lower, and, consequently, hotter layers, it was necessary to examine the spectrum of oxygen when submitted to high temperatures and great pressure. By ingenious devices, Dr. Janssen succeeded in raising oxygen to a temperature of 800° or 900°, and in placing the gas under a pressure of 1000 atmospheres. As before, his observations pointed to the absence of oxygen in the sun's atmosphere. His researches on the effect of planetary atmospheres in modifying the spectrum of solar light were equally thorough and satisfactory.

The observations made on Mont Blanc firmly convinced Dr. Janssen of the advantages offered by high mountains for the conduct of certain inquiries, in

which it was of importance to reduce as far as possible the thickness of the atmosphere, through which observations had to be made. In spite of increasing age and the inconvenience of lameness, he interested himself energetically in the construction of the Mont Blanc Observatory, and on more than one occasion personally made the ascent of the mountain to assure himself of the success of the enterprise. Under his auspices various physical inquiries have been successfully pursued in this elevated observatory.

As an observer of the sun at the time of total solar eclipse, Dr. Janssen was indefatigable. In 1868, he began that long series of observations which have so much enriched our knowledge of the sun's surroundings. For it was while observing this eclipse at Guntöör that he was impressed with the possibility of observing the prominence lines on the limb of an uneclipsed sun. How, without delay, he put his plan into operation and enjoyed the advantage of a prolonged eclipse is well known, as also the fact that the announcement of his discovery reached the Paris Academy of Sciences at the same time as a similar contribution from Mr. (afterwards Sir Norman) Lockyer informed that body of the successful results of his more prolonged researches. The claims of each have been fully admitted, and just as the names of Adams and Le Verrier are connected with a famous problem in gravitational astronomy, so those of Lockyer and Janssen are joined in the solution of a fundamental problem of physical astronomy. A medal containing effigies of the heads of the two astronomers side by side was struck by the French Government to commemorate this "Janssen-Lockyer Discovery." This is an oft-tale tale, and it would not be necessary to repeat it here but for one circumstance which is not so well known, and which it is desirable to emphasise. This is the generous recognition which Dr. Janssen ever expressed towards his English *compère*, and his ready acknowledgment of the value of English work. Fortunately, the days of international jealousy in science have passed, but the loyal and hearty appreciation which Dr. Janssen exhibited stands out as a conspicuous example of unselfish and kindly interest, in which no unworthy considerations found a place. Needless to say that his warm-hearted sympathy and encouragement was highly valued and cordially reciprocated.

At Sir Norman Lockyer's suggestion, Janssen was invited to join the English Eclipse Expedition of 1870, and as he was then in besieged Paris, thanks to the exertions of the English Foreign Office the invitation reached him there by the hands of Bismarck, who accompanied it with a safe conduct. This he declined, and left the beleaguered city in a balloon. On that occasion he carried with him the essential parts of a reflector especially constructed to collect evidence about the solar corona. He repaired to Oran, and deserved better fortune than to find the sky completely obscured by clouds at the time of the eclipse. In 1871 and 1875 he was again in Asia, taking part in the observation of solar eclipses, while in 1883 he was one of that remarkable party of enthusiasts who repaired to the lonely coral reef in the Pacific known as Caroline Island. For this eclipse Dr. Janssen used telescopes of six and eight inches aperture, and on his photographs obtained an extension of the corona further than it could be traced in the field of the telescope, revealing a remarkable complexity of structure. Here, too, he confirmed his previous suspicions of the presence of reflected Fraunhofer lines in the spectrum of the corona. His passionate interest in solar phenomena never deserted him, and on the occasion of the eclipse in 1905, notwithstanding his advanced age, he was

found among the observers stationed on the line of totality as it crossed the Spanish peninsula. At a still later period, when the International Union for Cooperation in Solar Research met at Meudon, last May, Dr. Janssen, as president of the congress, exhibited an unflagging interest in all that could promote the object of the meeting.

On the occasion of the transit of Venus in 1874, Janssen not only took part in the observations—going for this purpose to Japan—but devised an apparatus to take a number of pictures of the sun in a short space of time. In many ways the late astronomer distinguished himself by his photographic researches. Not only was he one of the first to direct his attention to the possibility of photographing comets and nebulae, securing satisfactory pictures of Tebbutt's comet of 1881 and of the Orion Nebula, but his photographs of the solar surface, taken at the Meudon Observatory, have acquired a world-wide renown, both for the beauty of the results obtained, and the ingenuity of the devices employed to secure short and uniform exposures. These photographs were not left as mere pictures to please the eye by the infinite variety they revealed. They were studied and compared until the photospheric network of varied granulation was made to disclose its tale, and put us in possession of the beginning of a solar meteorology. In the course of his photographic experiments he was led to suggest the use of a camera with double slits, so as to allow only a narrow portion of the spectrum to reach the photographic plate, a method of observation which in the hands of Prof. Hale and Deslandres has proved so effective.

He served his country in many capacities, but perhaps rendered no service greater than that of establishing and organising the observatory at Meudon. By this act a permanent home for the furtherance of physical astronomy and solar research has been ensured, and here the work which he began and pursued with such eagerness will be carried on with more powerful instruments than were at his command; but however successful its future career may prove, it will owe its origin in no small measure to the insistence, perseverance, and reputation of Dr. Janssen.

In many ways his colleagues acknowledged the value and extent of his services. He was Commander of the Legion of Honour, Membre de l'Institut; he was the oldest member of the Academy of Sciences, having succeeded Langier in 1873. He was also a member of the Bureau des Longitudes, and had been decorated with the Lalande medal. The learned societies of many countries enrolled his name on their list of fellows. In this country he was a foreign member of the Royal Society, from which he received the Rumford medal for his researches; Edinburgh made him an LL.D. of that university, and in 1872 he was elected an Associate of the Royal Astronomical Society.

#### NOTES.

THE annual meeting of the British Science Guild will be held at the Mansion House at 4.15 p.m. on Wednesday next, January 15, by invitation of the Lord Mayor. Mr. Haldane, president of the Guild, will address the meeting; and among other speakers will be Dr. T. H. Warren (Vice-Chancellor of the University of Oxford), Sir Archibald Geikie, K.C.B. (secretary of the Royal Society), Sir John Rhys, Sir Wm. Bousfield, Sir John Wolfe-Barry, K.C.B., F.R.S., and Mr. A. Siemens.

THE death is announced of Prof. Albert Lévy, professor of mathematics at the Paris Municipal School of Industrial

Physics and Chemistry, and director of the chemical department of the Municipal Observatory of Montsouris. Prof. Lévy was well known for his analyses of the air and water supply of Paris.

A TELEGRAM from Brownstown, Jamaica, announces that a severe earthquake occurred at 8.5 a.m. on January 3. Considerable damage is reported from Kingston and other places on the south shore.—Reuter reports on January 4 that Vesuvius is again active. The volcano is emitting clouds of vapour from large fissures near the summit of the crater, and also towards Atrio Cavallo.

A REUTER message from Rome states that Signor Rava, Minister of Public Instruction, has appointed a special commission to direct and supervise the excavations at Herculaneum, composed of Commendatore Gattini, administrative director of the Museum of Naples; Signor De Petra, professor of archæology of the University of Naples; Prof. Gabrici and Prof. Dall'Ossio, both of the Naples Museum; Prof. Sogliano, director of the excavations at Pompeii; Commendatore Avena, director of the technical office of the monuments of Naples; and two civil engineers of the province of Naples.

ON Tuesday next, January 14, Dr. A. A. Gray will deliver the first of two lectures at the Royal Institution on the internal ear of different animals, and on Thursday, January 16, Prof. W. W. Watts will deliver the first of two lectures on (1) the building of Britain. On Saturday, January 18, Prof. Gisbert Kapp will commence a course of two lectures on the electrification of railways. The Friday evening discourse on January 17 will be delivered by Prof. T. E. Thorpe, on the centenary of Davy's discovery of the metals of the alkalis, and on January 24 by Colonel David Bruce, on the extinction of Malta fever.

THE discovery of a large group of dene-holes in the woods between Woolwich and Erith, close to the ruins of Lessness Abbey, was announced in the *Times* of January 3. Two of these holes have already been explored, the position having been marked in each case by a shallow cup-like depression on the surface overgrown with verdure. Excavation in the centre of the hollow exposed the shaft, which is rather more than 3 feet in diameter, and circular in transverse section. After descending for about 50 feet through loam, the shaft enters chalk, and having penetrated this for 4 feet or 5 feet expands into chambers about 18 feet in height. In the sides of the shafts are holes, evidently for supporting a rude kind of ladder for descent. A conical mound of earth, about 10 feet high, occupies the floor at the bottom of the shaft. Each cave has six chambers grouped radially around the central shaft, so as to form in plan a rough double trefoil, recalling the pattern familiar to explorers of dene-holes elsewhere.

ACCORDING to a paper by Mr. H. Beeston published in the December (1907) number of the *Zoologist*, the breeding-range of the marsh-warbler in the south of England is gradually spreading east, a nest having been observed during the past summer in Hampshire. The nest was attached to four or five reeds at an elevation of about 4 feet, like that of a reed-warbler.

TO *Nature* for November and December, 1907, Prof. A. W. Brögger contributes an illustrated article on "coliths," in which a number of types from various parts of Europe are described and figured. The author appears to be convinced that these stones were shaped by human agency for special purposes, describing some as knives, others as scrapers, &c.